

"The Economics of Climate
Change:
What do the Expected Damages
Imply?"

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Objective of Mitigation

- Minimize the present value of global abatement costs and climate damages (Nordhaus 1992)
- Minimize the present value of adaptation costs and climate damages (Mendelsohn 2000)

Policy Insight

- Mitigation policy should be universal- all polluters should equate marginal cost
- Mitigation policy should equate marginal cost to present value of global marginal damage
- Mitigation policy should be dynamic- marginal costs should rise as marginal damages rise

Objective of Adaptation

- Minimize the present value of adaptation costs and climate damages (Mendelsohn 2000)

Policy Implications

- Adaptation is local
- Depends on local climate change and local impacts
- Timing must fit dynamics of impacts

Mitigation and Adaptation

- Optimal policy is to use both
- Adaptation reduces damages and so reduces incentive to do mitigation
- Mitigation reduces damages and so reduces the need for adaptation

How much mitigation?

- Depends on costs of mitigation
- Research suggests near term marginal cost function for mitigation is very steep
- Long term marginal cost function will be flatter
- Suggests delaying mitigation to take advantage of technical change
- Suggests all sources must be included or cost of program rises sharply

What are climate impacts?

- Market: agriculture, coastal, energy, forestry, tourism, water
- Nonmarket: ecosystem, health, aesthetics
- Extreme events
- Catastrophes

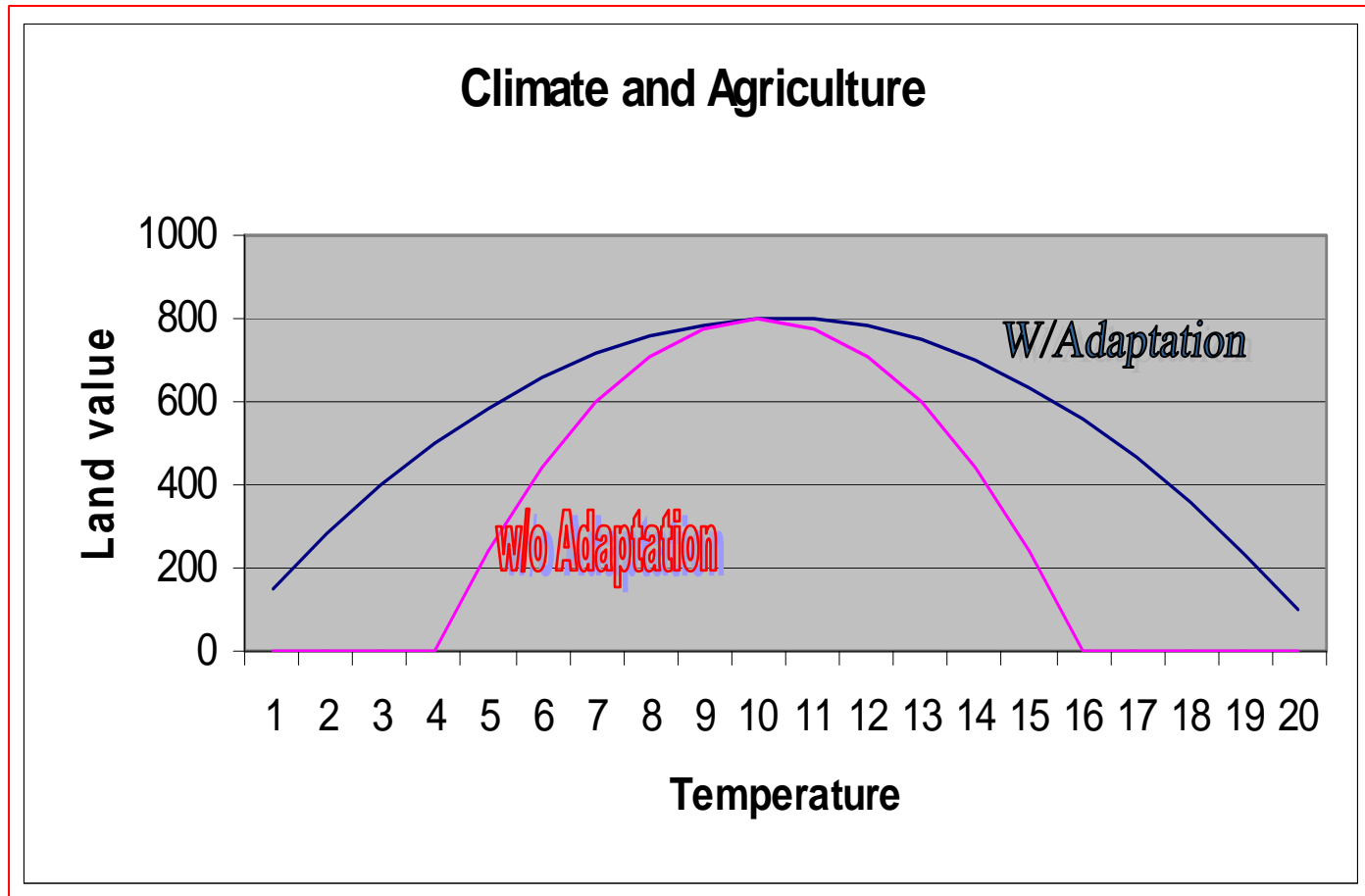
Mitigation and Impacts

- Larger (smaller) impacts suggest more (less) mitigation
- Scientists argue predicted climate changes are more severe now than before (not clear)
- Economic estimates of climate change damages, however, have been falling
- Estimates in IPCC 1996 were 2% of GDP by 2100 (Pearce et al 1996)
- Estimates in 2000's closer to 0.1% to 0.3% of GDP by 2100 (Tol 2002; Mendelsohn and Williams 2005)

What explains lower values?

- Benefits of climate change now recognized not just damages
- Adaptation will reduce potential effects dramatically
- Future economy will grow exponentially making climate damages relatively smaller (past studies looked at future impacts on current economy)

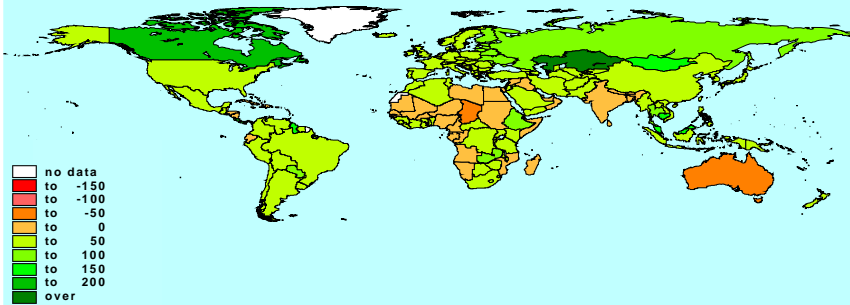
With and Without Adaptation



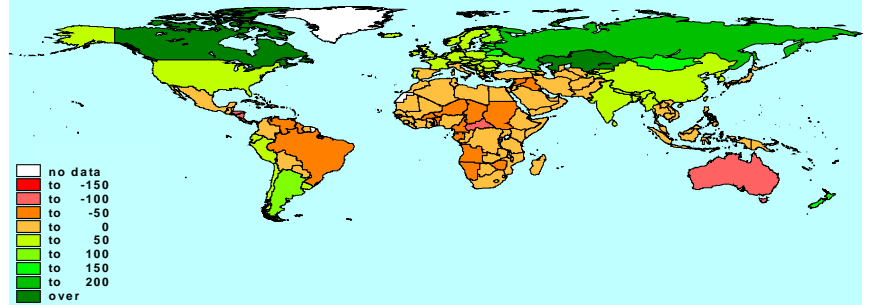
Impacts depend on climate scenario

- Milder wetter scenarios will increase general welfare
- Moderate scenarios will have little net effect
- Severe hot and dry scenarios, however, will likely lead to large damages
- Impacts vary with the low latitudes bearing up to 80% of damages

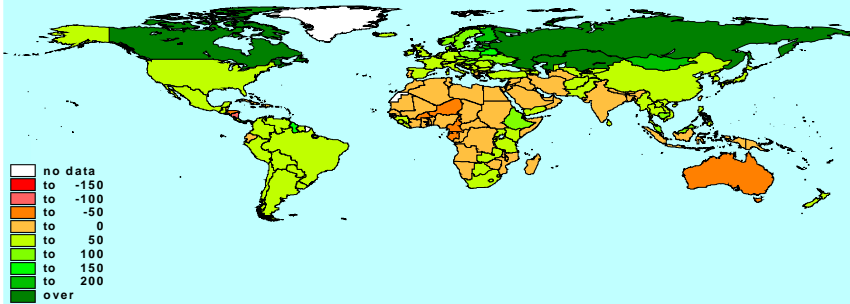
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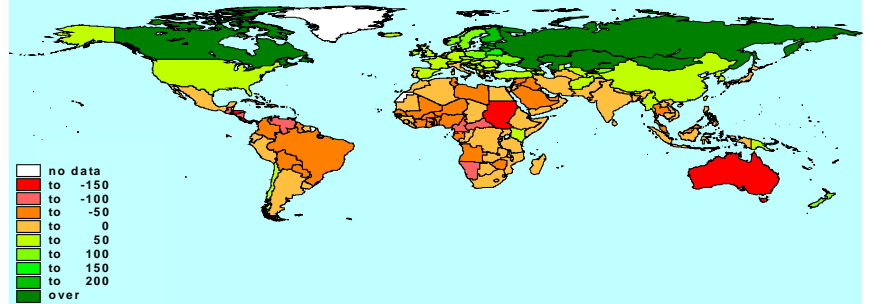
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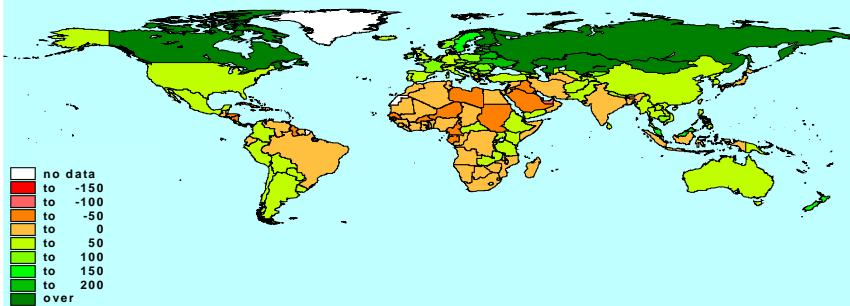
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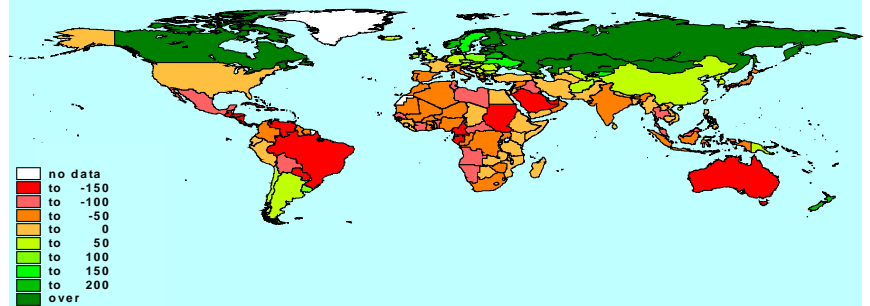
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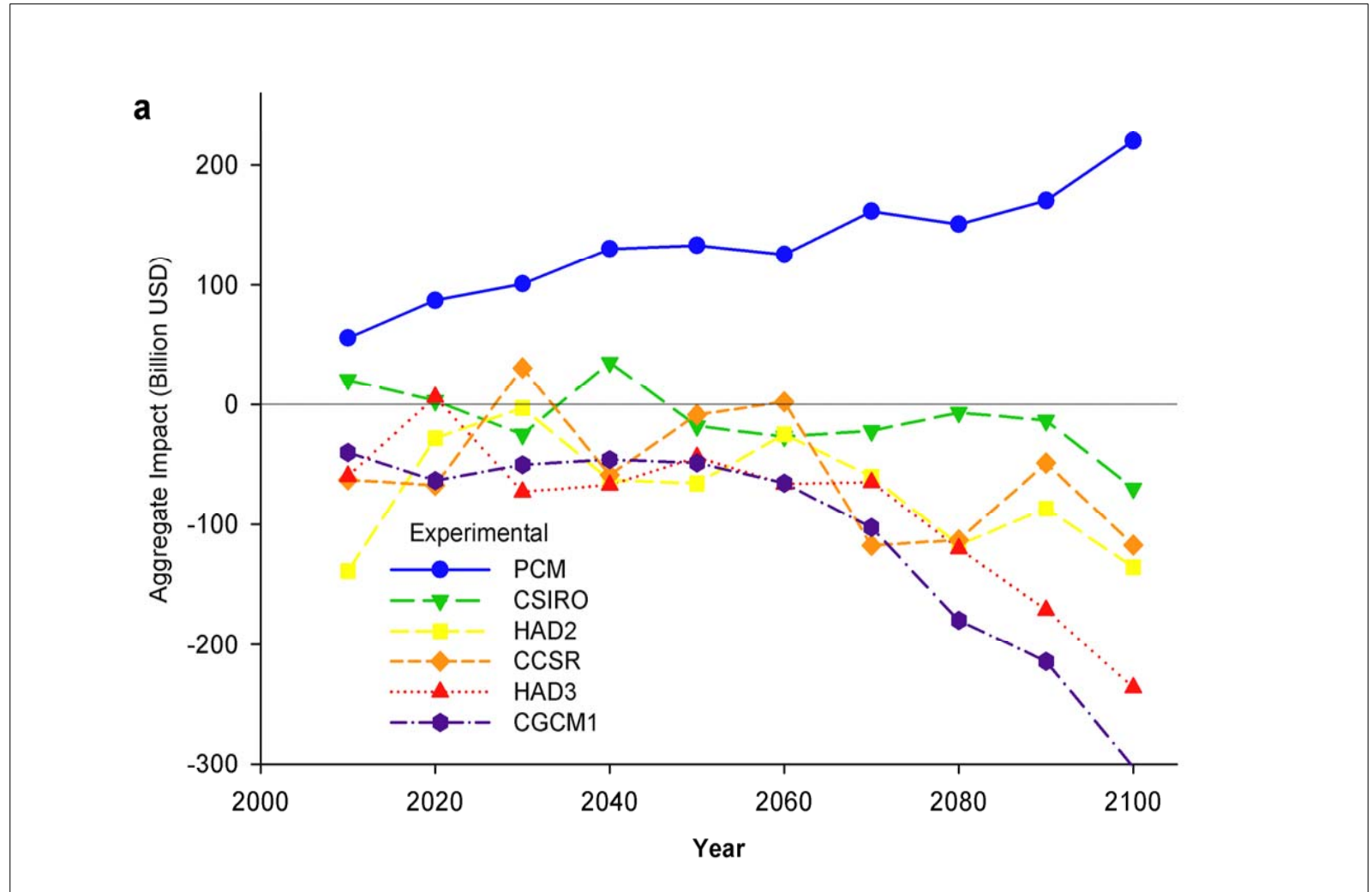
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Global Net Market Impacts over Time



What are the policy implications for mitigation?

- Current marginal damage of emissions is low (\$5/ton carbon)
- Marginal damage will rise over time- about 2% per year
- Countries must take a global perspective or program will fail

What are policy implications for adaptation?

- Private adaptation- actions taken to make oneself better off-will occur regardless
- Public adaptations- actions taken to make many people better off- will need government assistance
- For example, infrastructure for waterways, coastal structures to stop sea level rise, public health measures to stop disease.

Adaptation design

- Each local area must decide what adaptations make sense for their area
- They should time the actions to match the impacts
- For example, raise coastal structures to anticipate sea level rise of next decade
- Uncertainty about impacts suggests that adapting as climate changes is best strategy

Inequity-Compensation

- Climate change is unfair- emitters are rarely damaged
- Compensation could address impacts to rural poor in low latitude countries
- What is best way to provide compensation- relief programs, aid, or development assistance?

Catastrophe-Irreversibility

- Cumulative emissions could set off events that are worse than we expect and cannot be reversed by mitigation
- Need geoengineering as insurance
- High altitude particles to cool planet in case of emergency
- Eliminates chance of catastrophe

Research

- Important to learn more about mitigation costs
- Important to continue to study climate impacts
- Need to plan for geoengineering in case it is needed
- Need to design effective development strategy that will help low latitude countries diversify from agriculture